

## Effect the stages of lactation on some hematological and biochemical parameters in ewes

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### ABSTRACT

This study was conducted on the sheep of the Animal House/Tikrit university/College of Veterinary Medicine In period between 15.12.2009 to 30.1.2020, The total animal was used is 15 ewes . Five ml of blood samples were collected from the jugular vein in the different stages of the lactation , as the study include 15<sup>th</sup> , 30<sup>th</sup> and 45<sup>th</sup> day of lactation. Where used for determine hematological and biochemical parameters. The results revealed A decreased ( $P \leq 0.05$ ) in total red blood cells, haemoglobin and packed cell volume, ( $4.6 \pm 1.03$ ,  $7.7 \pm 0.25$ ,  $23.1 \pm 1.56$ ) respectively in 15 day of the lactation compare with 30<sup>th</sup> and 45 day of the lactation. The total white blood cells count were decreased ( $6.8 \pm 0.41$ ) during the 45 day of the lactation. Results demonstrate significant decrease ( $P \leq 0.05$ ) in concentration total of protein, glucose, cholesterol ,triglyceride and urea concentration ( $6.8 \pm 0.18$ ,  $66.3 \pm 0.44$ ,  $52 \pm 0.78$ ,  $36.8 \pm 0.05$ ,  $28 \pm 0.45$ ) respectively at the 15 day of lactation. While creatinine decreased ( $P \leq 0.05$ ) during the 45<sup>th</sup> day of the lactation ( $0.86 \pm 6.65$ ). we conclude, from the study that there are present differences significant in hematological and biochemical parameters during the first stages of lactation..

### 1. Introduction

Livestock is a major source of national income and food security in most countries of the world, Sheep in Iraq is

one of the most important animal of protein-rich red meat in addition to milk production [1].

Lactation is a very demanding period for an animal as its nutritional needs are increased. In conventional production during this period, especially in the first half of lactation, it is difficult to satisfy the nutritional requirements of animals because of high milk production [2]. In beginning lactation, energy consumption is decrease if in comparison to animals' needs, indicating negative energy balance, which mobilizes body reserves. Consequently, significant changes may occur in the ewes in early lactation period, which can lead to metabolic disorders [3]. In sheep, the most relevant changes in serum metabolic profile have been detected at the beginning of lactation. because considered as most critical and stressful period because of high nutritional requirements for colostrum and milk production [4]. During lactation, the mammary gland secretory cells use about 80% of blood components for milk synthesis [5]. Due to that, significant changes in the ewes in early lactation period lead to the occurrence of metabolic disorders. Blood biochemical parameters along with total protein, triglycerides, free fatty acids and urea are essential signs of the metabolic vigor in lactating animals [6]. In the early lactation period, there is a change in some blood metabolites such as insulin, glucose, protein, cholesterol triglycerides, BUN and creatinine [7]. In fact, hypoglycemia was the primary metabolic disorders in late pregnancy and early stage lactation period in ewes due to decrease feed supply with pregnancy and lactation show that hypoglycemia occurs in the first 21 days postpartum with a return to normal at 41 days postpartum in dairy cows [8].

**The aim of the study** Therefore, this study designed to measure Hematological and Biochemical parameters during the ( 15, 30, 45) in post-parturient period in ewes.

## **2. Material & method**

### **2.1 Experiment animals:**

This research was done on animal house /University of Tikrit/ college of Veterinary Medicine from 15.12.2009 to 30. 1.2020. The experiment was split into three stages of lactation, the first stage being 15 days after birth, the second stage after 30 days of lactation and the third stage after 45 days of lactation. The study covered 15 cases, all of which were healthy, disease-free and continuously veterinary supervised.

Blood sample were regularly collected during three lactation stages every 15 days, from the Jugular vein in the neck area with a 5-ml syringe and divided into two parts, the first part (1 ml) being placed in sterile plastic tubes containing Ethylene diamine tetra acetic acid (EDTA). For blood tests, the other part (4 ml) was placed in clean, sterile plastic tubes and left to be deposited for an hour at laboratory temperature. It was then placed in the centrifuge for 10 minutes at a speed of 3000 cycles/minute for the purpose of separating the blood serum from the rest of the components, keeping the serum with the freezer (- 20 °C) in closed tubes until chemical tests were carried out.

### **2.2 Hematological examinations:**

Hematological parameters such as total red blood cells and white blood cells

by haemocytometer. Haemoglobin was determined by the Sahli method, while packed cells volume was determined using microhaematocrit method as described by [9].

### 2.3 Biochemical examination:

The biochemical parameters includes (Total proteins, glucose, cholesterol, triglyceride, urea, creatinine), were measured by spectrophotometer with special kit (British Randox kits) as described by [10], at the physiology Lab., Collage of Veterinary Medicine, University of Tikrit.

### 2.4 Statistical analysis

SPSS using paired t-test (a Repeated Measures ANOVA) The differences were set at ( $p \leq 0.05$ ) [11].

### 3. Result & discussion

This study showed significantly decrease ( $p \leq 0.05$ ) in the RBC, Hb, ( $4.6 \pm 1.03$ ,  $7.7 \pm 0.25$ ) respectively on the 15th day of lactation compared to the 30th and 45th day of lactation respectively. The PCV was significantly ( $P \leq 0.05$ ) decreased ( $23.1 \pm 1.56$ ) during the 15th day compared to the 45th day ( $26.4 \pm 2.05$ ) (Table1).

**Table 1: Changes in the hematology parameters during (15<sup>th</sup>, 30<sup>th</sup>, and 45<sup>th</sup>) day of Lactation in ewes (mean  $\pm$  SE)**

parameters	15 day	30 day	45 day
RBCx10 <sup>6</sup> / $\mu$ l	4.6 $\pm$ 1.03c	5.5 $\pm$ 0.432b	6.4 $\pm$ 0.36a
Haemoglobin (g/dl)	7.7 $\pm$ 0.25 b	8.1 $\pm$ 0.58a	8.8 $\pm$ 1.32a
Hematocrit %	23.1 $\pm$ 1.56c	24.5 $\pm$ 0.73b	26.4 $\pm$ 2.05a
WBCx10 <sup>3</sup> / $\mu$ l	8.6 $\pm$ 1.43a	7.7 $\pm$ 1.32b	6.8 $\pm$ 0.41c

**Different letters between columns mean significant differences at ( $P \leq 0.05$ ).**

The Decline in the number of RBC in the blood of ewes in the early lactation was also reported by [2]. [12] determined decrease ( $P \leq 0.05$ ) of Hb in ewes in the first month of lactation.

The reason for the decline RBC, HB and PCV during early lactation is due to the hemodilution effect resulting from an increase in plasma volume and/or the increasing water mobilization to mammary gland through the vascular system [13]. also, this result agree with [14] where it showed its results decrease in count of RBC and Hb in the blood of ewes in early lactation.

The results of the current study steady the findings of [15] spotted that the Hb and PCV count lower in 1st week and improved from onwards of 2nd weeks of lactation attributed to the stress related to parturition. The present study demonstrate significant decrease ( $P \leq 0.05$ ) of WBC in 45 day ( $6.8 \pm 0.41$ ) compared to the 15 and 30 day of the lactation ( $8.6 \pm 1.43$ ,  $7.7 \pm 1.32$ ) respectively (Table1). And this agrees with [16, 17] who showed decrease in leukocytes with the progression of lactation. Similar content of leukocytes in lactating goats was found by [18]. Also

these changes may be attributed to an increase in the cortisol level (as a result of an increased milk yield), which is probably responsible for the impairment of the cellular immune response [19]. which may be attributed to stress that stimulates secretion of adrenocorticotrophic hormone which in

turn induces the adrenal cortex to produce glucocorticoids, involved in the mobilization of granulocytes from body pool into the peripheral circulation [20]. A statistically significant ( $P \leq 0.05$ ) decrease in total proteins was recorded on day 15 of the lactation and increased subsequently in 30 and 45 days (Table 2).

**Table 2: Changes in the concentration of biochemical parameters during (15<sup>th</sup>, 30<sup>th</sup>, and 45<sup>th</sup>) day of Lactation in ewes (mean  $\pm$  SE)**

Parameters	Stages lactation		
	15 day	30 day	45 day
Total protein (g/dl)	6.8 $\pm$ 0.18b	7.0 $\pm$ 0.17a	7.6 $\pm$ 0.35a
Glucose (mg/dl)	66.3 $\pm$ 0.44b	77.8 $\pm$ 1.72a	79.5 $\pm$ 0.66a
Cholesterol (mg/dl)	52 $\pm$ 0.78b	57.8 $\pm$ 0.52b	65.5 $\pm$ 0.67a
Triglyceride (mg/dl)	36.8 $\pm$ 0.05a	37 $\pm$ 0.01a	39 $\pm$ 0.09a
Urea (mg/dl)	28 $\pm$ 0.45c	37.3 $\pm$ 0.36b	42.5 $\pm$ 0.52a
Creatinine (mg/dl)	1.01 $\pm$ 7.34a	0.89 $\pm$ 5.67b	0.86 $\pm$ 6.65b

Different letters between columns mean significant differences at ( $P \leq 0.05$ )

The finding of the present study are like that of [21]. The differences reflect the maternal demands of proteins require for milking and providing immunoglobulins [22, 23, 24]. During lactation in, there is an increase in serum total protein level of serum was observed with the progress of lactation due to the catabolism of protein for milk synthesis [25].

In our study, indicated that the mean concentration of blood glucose was lowest significantly ( $P \leq 0.05$ ) in the 15 day and increased subsequently in 30 and 45 days (66.3  $\pm$ 0.44, 77.8  $\pm$ 1.72, 79.5  $\pm$ 0.66) respectively (Table 2). This decrease in blood glucose level was probably due to negative energy balance and its utilization for blood sugar synthesis [26]. The hypoglycemia after parturition was attributed to large

amount of blood glucose withdrawal by the mammary gland for the synthesis of milk lactose [27]. [28] mention in prior reports suggesting fatty liver develop just after parturition characterized by depleted liver glycogen and lowered serum glucose levels. The decreasing blood glucose concentration during first 2 weeks of lactation to be relate to high energy demand especially in high milk producing and increasing glucose concentration after the 2<sup>nd</sup> week of lactation may be due to the recovery of feed intake and decreasing negative energy balance [21].

The results of the study showed a decrease significantly ( $P \leq 0.05$ ) in cholesterol and triglycerides level on the 15<sup>th</sup> day of the lactation compared to 30 and 45 day (52 $\pm$ 0.78, 57.8 $\pm$ 0.52, 65.5 $\pm$  0.67 cholesterol & 36.8 $\pm$ 0.05, 37  $\pm$ 0.01, 39

$\pm 0.09$  triglycerides) (Table 2). This is consistent with [29] who showed a decrease in the concentration of total cholesterol in the blood after birth and an increase with the progression of lactation. The higher level of cholesterol with advancement of lactation was a physiological adjustment to meet the lactation requirements [30].

Decline in triglycerides in 15 day agrees with [31] who observed the lowest concentrations of the compound 2-3 weeks post-partum. During lactation the insulin stimulation of lipogenesis becomes inefficient what is confirmed by the significant decrease in serum triglycerides and total cholesterol post-partum as reported by [32]. Furthermore, during this period, insulin resistance developed in late pregnancy persists, resulting in an increased lipolysis, which results in a significant decrease in serum triglycerides and total cholesterol [4]. [6] found that triglycerides are used by mammary gland to form the milky fats and their request increase until the peak of lactation.

Urea concentration reduce significantly ( $P \leq 0.05$ ) in 15th day ( $28 \pm 0.45$ ) and increased significantly ( $p < 0.05$ ) in 30 and 45 th day of lactation ( $37.3 \pm 0.36$ ,  $42.5 \pm 0.52$  ) respectavily. could be either due to increased deamination or increased protein intake [23]. And this agree with both [29,33]. The decrease in serum BUN around parturition may be associated with the decline in feed intake due to stress and hormonal changes during the kidding [34].

The results showed a significant increase in creatinine on the 15th day ( $1.01 \pm 7.34$  ) compared to the 45th day ( $0.86 \pm 6.65$  ) at a significant ( $P \leq 0.05$ ). The quantity of creatinine created each day be depends on the amount present within the body, which itself depends on the dietary intake, rate of creatine synthesis and muscle mass [4]. The apparent increase in creatinine level at the early stage of lactation may be ascribed to uterine involution and myometrial protein degradation [22]. High need for energy by ewe during lactation leads to an increase in protein catabolism which increases blood creatinine level to an extent above the ability of kidneys to eliminate [13].

#### Conclusion

we conclude, from the study that there are present differences significant in hematological and biochemical parameters during the third stages of lactation.

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## تأثير مراحل الرضاعة على بعض المعايير الدمية والكيميوحيوية في النعاج

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### الملخص

اجريت هذه الدراسة على الاغنام للبيت الحيواني في كلية الطب البيطري \ جامعة تكريت للفترة من 15/12/2019 لغاية 2020/ 1/30 , شملت الدراسة 15نعجة، وتم سحب 5مل من الوريد الوداجي في مراحل التجربة المختلفة اذ اشتملت الدراسة ثلاثة مراحل كانت المرحلة الاولى بعد 15يوم الولادة والثانية بعد 30 يوم من الولادة والاخيرة بعد 45 يوم من الولادة لقياس المعايير الدمية والمعايير الكيميوحيوية. أظهرت النتائج انخفاضاً معنوياً ( $P \leq 0.05$ ) في العدد الكلي لكريات الدم احمر و خضاب الدم وحجم الخلايا المكذسة ( $1.03 \pm 4.6$ ,  $0.25 \pm 7.7$ ,  $1.56 \pm 23.1$ ) على التوالي في اليوم 15 من الرضاعة مقارنة مع 30 و 45 يوماً من الرضاعة. كما بينت الدراسة انخفاضاً معنوياً ( $P \leq 0.05$ ) في عدد خلايا الدم البيضاء ( $0.41 \pm 6.8$ ) خلال اليوم 45 من الرضاعة ، كما اظهرت النتائج انخفاضاً معنوياً ( $P \leq 0.05$ ) في تركيز البروتين الكلي وتركيز الجلوكوز والكوليسترول والدهون الثلاثية و اليوريا ( $0.18 \pm 6.8$ ,  $0.78 \pm 52$ ,  $0.05 \pm 36.8$ ,  $0.45 \pm 28$ ) على التوالي في اليوم 15 من الرضاعة ، بينما اظهر الكرياتينين انخفاضاً معنوياً ( $P \leq 0.05$ ) خلال اليوم 45 من الرضاعة ( $6.65 \pm 0.86$ ). نستنتج من الدراسة أن هناك اختلافات معنوية في المعلمات الدموية والكيميائية الحيوية خلال المراحل الأولى من الرضاعة.